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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/680,963	10/06/2000	Tetsuo Yamada	P107317-00017	1445

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EXAMINER

LONG, HEATHER R

ART UNIT	PAPER NUMBER
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2615

DATE MAILED: 01/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/680,963

Applicant(s)

YAMADA, TETSUO

Examiner

Heather R Long

Art Unit

2615

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 10-14 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-9 is/are allowed.
- 6) ☒ Claim(s) 1-3 and 6 is/are rejected.
- 7) ☒ Claim(s) 4 and 5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 October 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
2. The disclosure is objected to because of the following informalities:
 - a. Page 11, line 16: change "Figs. 4A and 4B" to – Fig. 4--.
 - b. Page 15, line 1: delete "an 7B".

Appropriate correction is required.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "33a" has been used to designate both the green photoelectric conversion elements and the read gates. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Brouwer et al. (EP 0 668 691 A1).

Regarding claim 1, the admitted prior art discloses in Figs. 15A and 15B a charge transfer device comprising: a semiconductor substrate (101); a charge transfer path formed in the semiconductor substrate and made of a first conductivity type semiconductor layer (105); and a plurality of charge transfer electrodes formed near above the charge transfer path (121). However, the prior art fails to teach a first pulse signal generator circuit for applying a either a first pulse signal train for n-phase (n being an integer larger than 1) driving of charges in the charge transfer path to the charge transfer electrodes or a second pulse train for (n + 1)-phase driving of charges in the charge transfer path to the charge transfer electrodes.

Referring to the Brouwer et al. reference, Brouwer et al. discloses a charge coupled imaging device comprising a first pulse signal generator circuit for applying a either a first pulse signal train for n-phase (n being an integer larger than 1) driving of charges in the charge transfer path to the charge transfer

electrodes or a second pulse train for $(n + 1)$ -phase driving of charges in the charge transfer path to the charge transfer electrodes (col. 6, lines 14-16: n -phase being 3 and $(n + 1)$ -phase being 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teaching of Brouwer et al. with the charge transfer device of the prior art which would allow the aspect ratio to be adjusted.

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Kawai (U.S. Patent 6,211,507).

Regarding claim 2, the prior art discloses in Figs. 15A and 15B a charge transfer device comprising: a semiconductor substrate (101); a charge transfer path formed in the semiconductor substrate and made of a first conductivity type semiconductor layer (105); and a plurality of charge transfer electrodes formed near above the charge transfer path (121). However, the prior art fails to teach a second pulse signal generator circuit for applying either a first pulse signal train for n -phase (n being an integer larger than 1) driving of charges in the charge transfer path to the charge transfer electrodes or a third pulse train for $(n \times m)$ -phase driving (m being an integer larger than 1) of charges in the charge transfer path to the charge transfer electrodes.

Referring to the Kawai reference, Kawai discloses an image sensor comprising a second pulse signal generator circuit for applying either a first pulse signal train for n -phase (n being an integer larger than 1) driving of charges in the

charge transfer path to the charge transfer electrodes or a third pulse train for (n x m)-phase driving (m being an integer larger than 1) of charges in the charge transfer path to the charge transfer electrodes (col. 6, lines 8-14; col. 8, lines 16-20: n-phase being 4 and (n x m)-phase being 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teaching of Kawai with the charge transfer device of the prior art in order to decrease power consumption and increase the maximum transfer quantity of signal charges.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Kawai (U.S. Patent 6,211,507) and in view of (Tanaka et al. U.S. Patent 6,075, 565).

Regarding claim 3, the prior art discloses in Figs. 15A and 15B a charge transfer device comprising: a semiconductor substrate (101); a charge transfer path formed in the semiconductor substrate and made of a first conductivity type semiconductor layer (105), the charge transfer path having first barriers having a high potential and second well layers having a low potential, disposed alternately (Fig. 15A, t1); a plurality of first and second charge transfer electrodes alternately formed near above the first barrier layers and first well layers of the charge transfer device (121 and Fig. 17); and a plurality of charge transfer electrode pairs each having adjacent first and second two charge transfer electrodes connected together (Fig. 17). However, the prior art fails to disclose a third pulse signal generator circuit for applying either a fourth pulse signal train of two-phase

for 2-phase driving of charges in the charge transfer path to two charge transfer electrode pairs or a fifth pulse signal train for 2k-pulse driving or more of charges in the charge transfer path to the charge transfer electrode pairs.

Referring to the Kawai reference, Kawai discloses an image sensor selecting between either a first pulse signal train for n-phase (n being an integer larger than 1) driving of charges in the charge transfer path to the charge transfer electrodes or a third pulse train for (n x m)-phase driving (m being an integer larger than 1) of charges in the charge transfer path to the charge transfer electrodes (col. 6, lines 8-14; col. 8, lines 16-20: n-phase being 4 and (n x m)-phase being 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teaching of Kawai with the charge transfer device of the prior art in order to decrease power consumption and increase the maximum transfer quantity of signal charges. However, the prior art in view of Kawai fails to disclose a third pulse signal generator circuit for applying either a fourth pulse signal train of two-phase for 2-phase driving of charges in the charge transfer path to two charge transfer electrode pairs or a fifth pulse signal train for 2k-pulse driving or more of charges in the charge transfer path to the charge transfer electrode pairs.

Referring to the Tanaka et al. reference, Tanaka et al. discloses a third pulse signal generator circuit for applying a fourth pulse signal train of two-phase

for 2-phase driving of charges in the charge transfer path or a fifth pulse signal train for 2k-pulse driving pulse.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teachings of Tanaka et al. with the prior art in view of Kawai in order to provide another option of n-phase driving pulse and (n x m) driving pulse since a 2-phase and its complement 4-phase driving pulse still satisfy the n-phase and (n x m)-phase equation as well as the 2-phase and the 2k-phase equation.

Regarding claim 6, the prior art in view of Kawai et al. in view of Tanaka et al. discloses all the subject matter as discussed with claim 3 including that the second well layer has an electric capacity larger than an electric capacity of the first well layer (prior art: Fig. 15B: t1). However, it fails to disclose that the charge transfer device further comprises a floating diffusion region formed adjacent to the second well layer for detecting an amount of charges transferred from the transfer path. Official Notice is taken that floating diffusion regions for detecting an amount of charges transferred from the transfer path are well known in the art. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a floating diffusion region in order to detect the amount of charges transferred from the transfer path. Furthermore, floating diffusion regions are formed at the end of a charge transfer path, thereby meaning that it would be adjacent to the second well layer that accumulates most of the charges being transferred.

Allowable Subject Matter

8. Claims 4 and 5 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: prior art fails to fairly teach or suggest a charge transfer device, in combination with all the other elements claimed, a charge storage region formed adjacent to the final stage of the charge transfer electrodes for temporarily storing charges transferred in the charge transfer path; and a charge detection region for detecting an amount of charges stored in the charge storage region.

10. Claims 7-9 are allowed.

11. The following is an examiner's statement of reasons for allowance: prior art fails to fairly teach or suggest a charge transfer device, in combination with all the other elements claimed, a charge storage region formed adjacent to the final stage of the charge transfer electrodes for temporarily storing charges transferred in the charge transfer path; and a charge detection region for detecting an amount of charges stored in the charge storage region.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Heather R Long whose telephone number is 703-305-0681. The examiner can normally be reached on Mon. - Thurs.: 7:00 am - 4:30 pm, and every other Fri.: 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Christensen can be reached on (703) 308-9644. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Heather R Long
Examiner
Art Unit 2615

HRL
January 10, 2005


TUAN HO
PRIMARY EXAMINER